

In-Line Inspection of Additive Manufactured Parts Using Laser Ultrasonics, Phase I

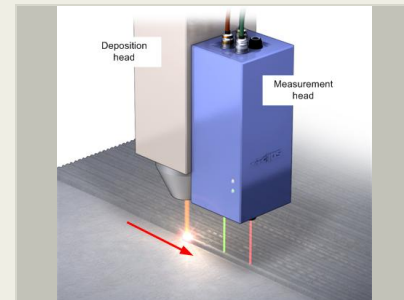
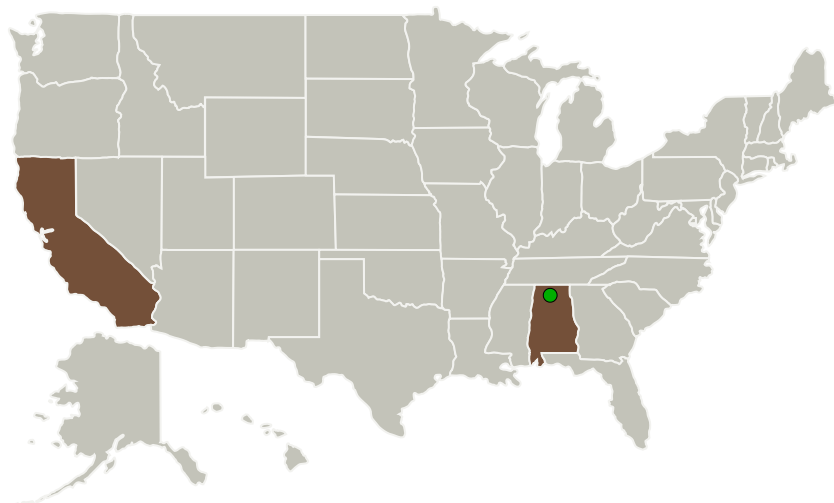
Completed Technology Project (2017 - 2017)



Project Introduction

Additive manufacturing (AM) is an increasingly popular technique for rapid, low-cost production of parts directly from a CAD file. AM is especially appealing for complex parts that would be costly or impossible to fabricate by machining or casting. It is also attractive for fabrication of prototype parts. At present there are no reliable, cost-effective process control techniques to minimize defect production and for qualification of finished parts. Studies at NASA, NIST, and other agencies have noted this gap and urged increased efforts to develop techniques for part qualification. In this project we will demonstrate the feasibility of applying laser ultrasonic testing to inspect each deposited layer in real time as it is formed. This in-line inspection qualifies the part layer-by-layer, ensuring finished parts that require no further testing. In Phase I we will first develop a database of the types and sizes of important defects in NASA-specific components. We will then optimize the beam configuration for sensitivity to these defects, and also develop signal processing algorithms to enhance defect detection and collect size information. In Phase II a prototype in-line inspection system will be developed and tested.

Primary U.S. Work Locations and Key Partners



In-Line Inspection of Additive Manufactured Parts Using Laser Ultrasonics, Phase I Briefing Chart Image

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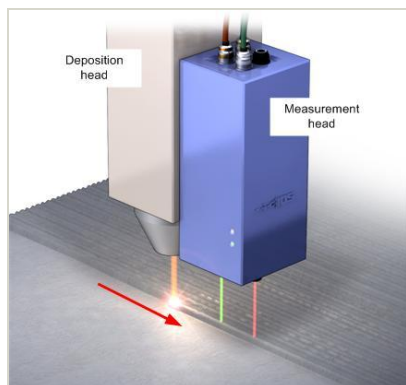
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Organizations Performing Work	Role	Type	Location
Intelligent Optical Systems, Inc.	Lead Organization	Industry	Torrance, California
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Images



Briefing Chart Image

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 (<https://techport.nasa.gov/image/129426>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Intelligent Optical Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

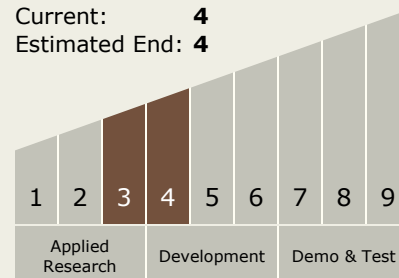
Carlos Torrez

Principal Investigator:

Marvin Klein

Technology Maturity (TRL)

Start: **3**
 Current: **4**
 Estimated End: **4**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.2 Design and Certification Methods